



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/531,665	04/15/2005	Hirotooshi Kamata	Q72438	1480

23373 7590 12/17/2007  
SUGHRUE MION, PLLC  
2100 PENNSYLVANIA AVENUE, N.W.  
SUITE 800  
WASHINGTON, DC 20037

EXAMINER
----------

BERMAN, SUSAN W

ART UNIT	PAPER NUMBER
----------	--------------

1796

MAIL DATE	DELIVERY MODE
-----------	---------------

12/17/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/531,665

Applicant(s)

KAMATA ET AL.

Examiner

/Susan W. Berman/

Art Unit

1796

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 November 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,5,7 and 8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,7 and 8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/07, 11/07</u> . | 6) <input type="checkbox"/> Other: _____  |

Art Unit: 1796

***Response to Amendment***

The rejection of claims 4 and 5 under 35 U.S.C. 112, second paragraph, is withdrawn.

The rejection of claims 1-8 under 35 U.S.C. 102(a) as being anticipated by WO 03/072614 is withdrawn. WO '614 discloses a photopolymerization initiator composition comprising a biimidazole initiator but does not suggest including a dicarbonyl compound.

New grounds of rejection are set forth herein below in response to the amended claims.

***Response to Arguments***

Applicant argues that neither Okamoto et al nor Dueber et al teaches or suggests the specific combination of hexaarylbiimidazole and dicarbonyl compound as defined in claims 1 and 2. The rejection of claims as being unpatentable over Okamoto et al (5,385,807) is withdrawn in favor of closer prior art cited herein below.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 7 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Chang et al (3,844,790). Chang et al disclose photopolymerizable compositions comprising ethylenically unsaturated compounds and a photoinitiator system comprising a hexaarylbiimidazole compound and a cyclic, tertiary, hydrogen donor compound. The disclosed cyclic hydrogen donor of the

Art Unit: 1796

formula set forth in column 4, line 51, to column 6, line 44, corresponds to the dicarbonyl compound in the instant claims wherein R<sub>3</sub> and R<sub>4</sub> form a ring. Hexaarylbiimidazoles are taught in column 6, line 45, to column 7, line 53. Preferably the biimidazole has phenyl rings substituted with chlorine and lower alkyl groups or alkoxy groups (column 7, lines 38-43).

Chang et al teach that the cyclic dicarbonyl compounds do not interfere with free radical induced addition polymerization. Chang et al also disclose comparative compositions comprising the acyclic dicarbonyl compound, dimedone (columns 19-20, Control J).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 5, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (3,844,790) in view of Dueber et al (5,643,657). Chang et al disclose photopolymerizable compositions comprising ethylenically unsaturated compounds and a photoinitiator system comprising a hexaarylbiimidazole compound and a cyclic, tertiary, hydrogen donor compound. The disclosed cyclic hydrogen donor of the formula set forth in column 4, line 51, to column 6, line 44, corresponds to the dicarbonyl compound in the instant claims wherein R<sub>3</sub> and R<sub>4</sub> form a ring. Hexaarylbiimidazoles are taught in column 6, line 45, to column 7, line 53. Preferably the biimidazole has phenyl rings substituted with chlorine and

Art Unit: 1796

lower alkyl groups (column 7, lines 38-43). Chang et al do not teach adding benzophenone, thioxanthone or ketocoumarin compounds to the disclosed photoinitiator systems.

Dueber et al disclose analogous compositions comprising ethylenically unsaturated monomers and a photoinitiator system. The preferred photoinitiator system includes 2,4,5-triphenyl-imidazolyl dimmers, such as "o-Cl-HABI" and o-chlorosubstituted hexaphenyl biimidazoles wherein the phenyl rings are substituted with chloro, methyl or methoxy in combination with chain transfer agents or hydrogen donors (column 12, lines 37-60). Dueber et al also teach particularly preferred photoinitiators include benzophenones, thioxanthenes, polynuclear quinones and hexaarylbiimidazoles (column 12, lines 61-67). With respect to claim 5, Examples 1-6 employ a combination of "o-Cl-HABI" and a benzophenone.

It would have been obvious to one skilled in the art at the time of the invention to select a hexaarylbiimidazole wherein the phenyl rings are substituted with chloro and methyl groups in the compositions taught by Chang et al because hexaarylbiimidazole substituted with chloro and alkyl groups is clearly disclosed by Chang et al in a small group of different species of hexaarylbiimidazoles. With respect to claim 2, It would have been obvious to one skilled in the art at the time of the invention to provide a hexaarylbiimidazole of the structure set forth because it would have been obvious to select methyl groups to provide alkyl substituted phenyl groups in a hexaarylbiimidazole such as the "o-Cl-HABI" specifically taught by Chang et al. One skilled in the art at the time of the invention would have immediately envisioned the compound of instant claim 2 from the structure of the disclosed "o-Cl-HABI" and the teaching of Chang et al that the phenyl radicals can be substituted with methyl and chloro.

With respect to claim 5, It would have been obvious to one skilled in the art at the time of the invention to employ a mixture of hexaarylbiimidazole with a benzophenone, thioxanthone or keto-coumarin compound as component (iii) taught by Dueber et al in the compositions disclosed by Chang et al. The reason is that Dueber et al teach that the photoinitiator system contains one or more free radical initiators analogous to the photoinitiator system disclosed by Chang et al and teach adding a sensitizer to extend spectral response of the initiator system and that benzophenones, thioxanthenes and polynuclear quinones are also particularly preferred photoinitiators and photosensitizers. Further motivation is provided by the use of benzophenone with a hexaarylbiimidazole in the Examples taught by Dueber et al. One skilled in the art at the time of the invention would have been motivated by a reasonable expectation of providing a photopolymerizable compositions having high sensitivity to actinic light from ultraviolet to visible light.

### *Conclusion*

Dueber et al ((6,218,074) is cumulative of Dueber et al '657.

Sasaki et al (5,837 422) disclose photopolymerizable compositions comprising a photoinitiator system comprising a free radical initiator such as a hexaarylbiimidazole and a sensitizer such as the beta-diketone taught by Chang et al in US 3,844,790.

Tsuji et al (5,723,260 or 5,800,965) disclose photopolymerizable compositions comprising a photoinitiating system comprising a free radical initiator such as a hexaarylbiimidazole in combination with a sensitizer such as the beta-diketone taught by Chang et al in US 3,844,790.

Art Unit: 1796

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to /Susan W. Berman/ whose telephone number is 571 272 1067. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on 571 272 1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1796

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SB  
12/10/2007

/Susan W Berman/  
Primary Examiner  
Art Unit 1796